

**UNCLASSIFIED**

---

---

**AD 277 277**

*Reproduced  
by the*

**ARMED SERVICES TECHNICAL INFORMATION AGENCY  
ARLINGTON HALL STATION  
ARLINGTON 12, VIRGINIA**



*20030620049*

**Best Available Copy**

---

---

**UNCLASSIFIED**

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

24-1170-100

1970-10-10

PAINTED BY ASTIA 2777277

2777277

USCONARC  
US ARMY  
ARCTIC TEST BOARD

Fort Greely, Alaska



NOX

Report of

CHECK TEST OF FILTER  
UNIT, GAS-PARTICLE, 2000,  
2000, FIVE-ONE, ETC.

Date May 1968 Project Nr. 400 2-12

HEADQUARTERS  
US ARMY ARCTIC TEST BOARD  
APO 733, Seattle, Washington

15 MAY 1962

REPORT OF PROJECT NR ATE 2-12  
CHECK TEST OF FILTER UNIT, GAS-PARTICULATE,  
TANK, FIVE-MAN, E37R1

1. AUTHORITY:

a. Directive: Line item Nr G 290, Annex G, Material Developments Program, Fiscal Year 1962, HQ USCOMAR, 1 June 1961.

b. Purpose:

(1) To determine if the modified Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1 is suitable for Army use under arctic winter conditions.

(2) To determine whether the deficiencies listed in enclosure 1 to reference 21 have been satisfactorily corrected.

2. REFERENCES:

a. DA Project Nr: 4C80-02-031. Technical Objective Nr: CH-4b.

b. CDDG, par 1236b(2), Change Nr 9, 31 December 1961.

c. Reports of Equipment Failures Nr 1 through 3, Project Nr ATE 2-12, US Army Arctic Test Board.

d. USCOMAR Ltr Rpt, Cml Cen 68-60, 24 March 1960, subject: "Final Engineering Test, Gas-Particulate Filter Unit, Five-Man, E37R1."

e. Ltr, ATDEV-2 451.6, HQ USCOMAR, 6 February 1961, subject: "Report of Test, Project 2051, US Army Armor Board, 9 December 1960, subject: 'Service Test of Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1', w/l incl."

f. USCOMAR Ltr Rpt, Cml Cen 102-61, 8 May 1961, subject: "Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1."

g. USCOMAR Ltr Rpt, Cml Cen 110-61, 11 May 1961, subject: "Mask, Protective, Tank, E36R2."

h. USCOMAR Ltr Rpt, Cml Cen 144-61, 19 June 1961, subject: "Mask, Protective, Tank, E36R2."

1. Ltr ATDEV-2 451.6, Eq USCOMAR, 14 July 1961, subject: "Report of Project Nr ATB 2-151, 'Service Test of Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1', w/l incl.

j. USCOMAR Ltr Rpt, Cml Cen 176-61, 1 August 1961, subject: "Hood, Tank, Protective Mask, E37R2."

k. USCOMAR Ltr Rpt, Cml Cen 183-61, 11 August 1961, subject: "Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2."

l. Ltr ATDEV-2 451.6, Eq USCOMAR, 3 October 1961, subject: "Report of Project Nr 2051-1, Check Test of Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2." w/l incl.

3. DESCRIPTION OF MATERIAL:

a. The Filter Unit, Gas-Particulate, Tank. E<sup>4</sup>rc Mask, E37R2 (test filter unit) is a crew protective system mounted in the M60 Main Battle Tank to remove toxic gases, dirt, and aerosols from the air supply and provide purified air to the tank crew.

b. The test filter unit particulate filter and blower motor are mounted to the right of, and are operated by the driver. The particulate filter consists of an M1A1 precleaner; an E45, 20-CFM, particulate filter; an electric motor with fan; and two E44, 10-CFM, gas filters. An E38 installation kit is provided with the test filter unit and contains mounting brackets, wiring harness, and hardware necessary for installation. Flexible metal tubing and hoses are used to duct the air to the four crew positions. An E39 rheostat controlled heater is mounted at each crew member's station to warm the air supply before it reaches the mask. The heater is provided with an "ON-OFF" toggle switch, an indicator light, and a rotary temperature selector switch.

c. A Combat Vehicle Protective Mask, E56R4, is used with the filter unit and its major components consist of a head harness, faceblank with spectacle supports, eyepiece nosecup, microphone assembly, outlet valve, inlet hose, canister, canister harness, and carrier. The E56R4 mask is designed to be worn connected to the forced air supply, or disconnected and worn outside the tank. The canister harness design permits the canister to be worn with or without the canvas carrier.

d. Tank protective mask spectacles are provided for personnel who must wear eyeglasses. They are designed with two prongs on each rim to fit into the spectacle supports in the faceblank of the mask.

e. A winterization kit is provided with the E56R4 mask and consists of a plastic eyepiece insert and outsert and a heat conserving jacket that covers the chin, outlet valve, and approximately six inches of the inlet hose.

f. An E34R2 hood, which covers the head and neck of the wearer, is provided for protection against vapors, aerosols, and droplets. It is made of butyl-rubber-coated nylon cloth and has an opening to accommodate the eyepieces of the mask. Under-arm straps secure the bottom of the hood on the wearer's shoulders. A neck cord slide fastener holds the hood close around the neck. Two hose cords on the outside of the hood and two temple straps secure the hood to the facepiece.

g. The following components of the test filter unit and a complete maintenance package were received on 6 September 1961:

(1) Mask, Protective, Tank, E56R4	10 each
(2) Hood, Tank, Protective Mask, E34R2	10 each
(3) Kit, Winterization E41 for E56R4 Mask	10 each
(4) Kit, Spare Parts for E41 Winterization Kit	1 each
(5) Kit, Spare Parts for E56R4 Mask	1 each
(6) Heater, E39, with installation parts	8 each

h. Four pairs of tank protective mask spectacles were received from US Army Prosthetics Laboratory, Walter Reed Army Medical Center, Washington, D. C. on 14 September 1961.

i. Photographs of the test filter unit and components are shown in Annex C.1 through C.7.

b. BACKGROUND:

a. A requirement for the test filter unit is stated in reference 29.

b. In October 1943, research was directed toward the development of a tank collective protector system. On 20 July 1954, a system was standardized and designated Protector, Collective, Tank, Three-Man, M6. The unit was later renamed the Filter Unit, Gas-Particulate, Three-Man, M6A1. The principle shortcoming of the M6A1 filter unit was the M4 tank mask. When worn at low temperatures, while disconnected from the M6A1 filter unit, the eye lens fogged and/or frosted to the extent that vision was impaired (ref 24).

c. In September 1952, research was directed towards providing a single protective system that could be adapted to standard and experimental vehicles, irrespective of the number or location of crew members within the vehicle. As a result, the E37 protective unit was developed to be used in conjunction with vehicular mounted heating and ventilating

systems. Tests conducted in May 1955 found this type of system to be unsatisfactory. The E37 unit was then modified to be compatible with existing or planned heating and ventilating systems. Change Nr 1, AR 700-62, 28 November 1958, added the requirement of a protective hood for use with the protective mask. Modifications were made and the resultant unit was designated the "Gas-Particulate Filter Unit, Five-Man, E37R1." In September 1960 the system was redesignated the "Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1" (ref 2d).

d. During the period June 1960 - November 1960, Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1 was service tested by the US Army Armor Board. Based on the results of these tests, the Armor Board concluded that the filter unit would be suitable for Army use when the deficiency concerning transmission of excessively cold air to the mask was corrected. On 6 February 1961, HQ USCOMARC concurred in these findings and recommended to Chief of Research & Development, DA, that the deficiency existing in the filter unit be corrected and that the modified filter unit be check tested (ref 2e).

e. During the period November 1960 - April 1961, Filter Unit, Gas-Particulate, Tank, Five-Man, E37R1 was service tested by this Board. Based on the results of these tests, this Board concluded that the filter unit would be suitable for Army use under arctic winter conditions when the deficiencies concerning excessive cold air transmitted to the mask, fogging of the mask's eyepiece, and wearing of eyeglasses with the mask were corrected. On 14 July 1961, HQ USCOMARC concurred in these findings and recommended to Chief of Research and Development, DA, that upon satisfactory completion of combined user/engineering check test under temperate climatic and cold chamber conditions, the Filter Unit, Gas-Particulate, Tank, Five-Man E37R1, be provided this Board for check test under arctic winter conditions (ref 2f).

f. A heating system was developed to provide individual heater units for the crew members and these units were designated the E39 heater assembly (ref 2f). With the inclusion of the E39 heater assembly, the filter unit was designated the E37R2 (ref 2k).

g. The protective mask was modified with spectacle supports, one at each temple, moulded into the rubber faceblank. Each support contained seven holes for adjustment of the spectacles to the wearer's eyes. The spectacle inserts were developed by the US Army Prosthetics Laboratories, Walter Reed Hospital, Washington, D. C. (ref 2g and 2h).

h. The E34R1 hood was modified by increasing the circumference of the crown portion by two inches to facilitate donning and doffing of the mask-hood combination. The under-arm straps were lengthened to increase the extent of adjustment, and the metal snap fasteners were replaced with two-inch nylon hook-loop fastening tape. With the inclusion of these modifications the hood was designated the E34R2 (ref 2j).

1. During the period July 1961 - August 1961, Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2 was check tested by the US Army Armor Board. Based on the results of these tests, the Armor Board concluded that the E37R2 filter unit was suitable for Army use and should be given a confirmatory test under arctic conditions. On 3 October 1961, Sq USCOMARC concurred in these findings and recommended to Chief of Research and Development, DA, that the Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2 be adopted and type classified Standard A and be provided this Board for confirmatory test under arctic winter conditions (ref 21).

j. This item is proposed for tripartite standardization and is included in Information Exchange List Sheet Nr 4-8-103-2.

5. SUMMARY OF TEST RESULTS: Tests were conducted by Captain Homer H. Jenkins, Armor, and other personnel of Test Division 2, US Army Arctic Test Board.

a. General:

(1) Throughout the test period the test filter unit was operated in accordance with the instructions contained in Technical Instructions 318-12(R) and 521-12(R).

(2) Throughout all tests, the test filter unit was evaluated against the military characteristics contained in reference 2d and the specifications of the E39 heating elements contained in reference 2f.

(3) The test filter unit was installed in an M60 tank and operated a total of 120 hours during 350 miles of tank operation. Prior to each testing period, the test filter unit was cold-soaked in the M60 tank for periods ranging from 6 to 72 hours. Ambient temperatures during cold-soak periods ranged from 40°F to -66°F.

(4) Ambient temperatures during operation of the test filter unit mounted in the M60 tank with the masks connected to the forced air supply ranged from 34°F to -49°F. Ambient temperatures during testing of the E56R4 masks disconnected from the forced air supply with tank crewmen dismounted from the M60 tank ranged from 40°F to -66°F.

(5) Throughout testing, the test filter unit was evaluated by tank crewmen wearing arctic winter clothing to include the Arctic Mitten Set.

(6) Throughout testing, the test filter unit was evaluated for compatibility with components of the M60 tank, and when used with arctic winter clothing. Two tank crews were used and each crew member was rotated between the four crew positions within the tank.

(7) Throughout all tests, particular attention was paid to whether the deficiencies previously reported (incl 1, ref 21) were satisfactorily corrected. The following deficiencies (Part A, Annex B) were reported during the service test conducted at this Board during the 1960 - 1961 test season:

(a) The forced air supply to the masks was unbearably cold at ambient temperatures below 20°F (corrected except at the loader's station).

(b) The mask's eyepiece fogged at ambient temperatures below 20°F when worn disconnected from the forced air supply (corrected: Eyepiece outsert provided).

(c) Standard eyeglasses caused the mask seal to be broken and excessive pressure was applied by the mask nosepiece (corrected: Spectacle inserts provided).

(8) The test filter unit was unsatisfactory with respect to the following:

(a) Functional suitability.

(b) Ease of operation.

(c) Comfort and safety at the tank commander, gunner, and driver stations.

(d) Maintenance.

(e) Durability and reliability.

(9) The test filter unit was unsatisfactory with respect to comfort and safety at the loaders position because of excessively cold air transmitted to the mask.

b. Test Nr 1 - Preoperational Inspection and Physical Characteristics:

(1) The test filter unit was given a technical inspection in accordance with the instructions contained in Technical Instructions 318-12(R) and 521-12(R). The inspection revealed that the filter unit and components were in proper condition for tests.

(2) The modified components of the test filter unit were weighed, measured, photographed, and examined for unusual characteristics. The E56R4 mask with the E34R2 hood, spectacles, and winterization kit installed, measured 12.0 x 12.0 x 4.5 inches when packed in the carrier,

and weighed 5.2 pounds. The E39 heater was 10.9 inches long, 4.4 inches wide, 5.1 inches high, and weighed 3.7 pounds. There were no unusual characteristics of the test filter unit and the physical characteristics were as described in paragraph 3, Description of Material.

(3) Photographs of the test filter unit components are contained in Annex C.1 through C.7.

c. Test Nr 2 - Functional Suitability:

(1) The test filter unit, installed in an M60 Tank, was operated by tank crewmen for periods up to 3 hours at ambient temperatures ranging from 34°F to -49°F. Prior to each period of operation, the masks and hoods were pre-heated by the E39 heaters for periods ranging from 15 to 20 minutes. The test filter unit provided a clean, warm supply of fresh air to the tank commander, gunner, and driver positions during the performance of normal crew duties for periods of three hours, the maximum time of wearing the mask connected to the forced air supply. The crew duties included firing 50 rounds of 105-mm ammunition, 1,440 rounds of caliber .50 ammunition from the M63 machine gun mounted in the M19 cupola, 600 rounds of 7.62-mm ammunition from the coaxial machine gun, and use of the M60 tank intercom and radio equipment. At ambient temperatures ranging from -37°F to -49°F, with the temperature inside the tank ranging from 3°F to -9°F, the forced air supply to the loader's mask was excessively cold. Operation at the loader's position when the loader's mask was connected to the forced air supply was limited to periods of 8 to 10 minutes. The transmission of cold air to the loader's mask occurred with both the 9-foot and the 6-foot lengths of hose connecting the E39 heater to the E56M4 mask canister (par 7, Annex B).

(2) The E56M4 masks and components were worn by a tank crew, disconnected from the forced air supply, at ambient temperatures ranging from 40°F to -66°F. Fifty rounds of 105-mm, 1,440 rounds of caliber .50, and 600 rounds of 7.62-mm ammunition were unpacked by the crew in an outdoor storage area, carried 75 meters, and loaded into the storage racks in the M60 tank. Maintenance performed outside the tank by personnel wearing the E56M4 mask disconnected from the forced air supply included refueling, checking and resupply of oil and lubricants, and removing a track block from both tracks. During testing, tank crewmen disconnected from the forced air supply, dismounted from the tank, and conducted simulated tactical exercises which included five to seven miles of dismounted movement in snow depths ranging from 4 to 12 inches. No difficulties were experienced by tank crewmen wearing the E56M4 mask disconnected from the forced air supply during the unpacking and handling of ammunition, performance of maintenance and refueling the tank, during dismounted exercises, or in voice communication between the crew members. No fogging of the eyepieces occurred during periods of strenuous activity and heavy breathing.

(3) Intermittently throughout the test period, chloroaceto-phenone (tear-gas) was introduced into a M60 tank with the hatches closed

and open and against dismounted crew members on the outside of the tank. No difficulties or mask leakage were encountered by tank crew members connected to or disconnected from the forced air supply.

(4) During installation of a pair of spectacle inserts into an E56M4 mask, the spectacle lenses fell out of the frames. This failure occurred after approximately 15 installations of the spectacles (par 8, Annex B).

(5) The eyepiece outserts (Annex C.7) were installed on the E56M4 mask and worn at ambient temperatures ranging from -37°F to -49°F in an M60 tank moving at speeds up to 30 mph. No difficulties were encountered and no fogging of the eyepieces or eyepiece outserts were encountered by the tank crewmen during operating periods when exposed in the open hatches of the M60 tank.

(6) The eyepiece insert with retaining clip (Annex C.7) was worn installed in 25 percent of the E56M4 masks both connected and disconnected from the forced air supply at ambient temperatures ranging from -37°F to -66°F. The insert was more difficult to install than the outsert; however, both corrected the previous deficiency of fogging of the eyepiece. Test personnel preferred the outsert because of ease of installation.

#### 4. Test Nr 3 - Ease of Operation, Comfort, and Safety:

(1) During simulated tactical operations over cross-country arctic terrain the test filter unit was utilized by tank crewmen in the M60 tank at ambient temperatures ranging from -37°F to -49°F. The M60 tank was returned to the firing line and the main armament and machine guns were fired. The tank commanders, gunners, and drivers experienced no difficulties during the performance of normal crew duties during simulated tactical operations or firing. The forced air supply transmitted to the loader's mask was excessively cold and caused discomfort and created a safety hazard to crew members occupying the loader's position (Test Nr 2).

(2) At ambient temperatures ranging from -53°F to -66°F, tank crewmen performed dismounted crew duties and simulated tactical exercises wearing the E56M4 mask and components. Crew duties consisted of resupply of ammunition, fuel and lubricants, and performance of maintenance outside the M60 tank. Simulated tactical exercises included dismounting from the tank, firing of individual weapons, movement in the open and through woods and brush in snow depths up to 12 inches. No excessive discomforts or safety hazards were encountered during dismounted operations and during the performance of normal crew functions.

(3) Tear gas was used intermittently against the tank crews connected to and disconnected from the forced air supply in a closed and open tank, and against the crews dismounted on the outside of the tank. No gas leakage was encountered and no discomforts or safety hazards were encountered attributable to the gas.

(4) Throughout testing, 50 percent of the tank crewmen wore the E56P4 mask with the spectacle inserts installed. The spectacle inserts caused no discomforts or safety hazards and tank crewmen experienced no difficulties during the performance of normal crew duties which were attributable to the spectacle inserts.

(5) The E39 heaters located at each crew station in the M60 tank were operated by tank crewmen wearing arctic winter clothing to include the Arctic Mitten Set. No difficulties were encountered during operation of the heaters by personnel wearing the Arctic Mitten Set.

(6) The E56M4 mask was donned in an average time of 8.4 seconds by tank crewmen wearing either the Arctic Mitten Set or Anticontact Gloves. Donning the mask and E34R2 protective hood required an average of 22 seconds when wearing the Arctic Mitten Set and 15 seconds when wearing Anticontact Gloves. Removing the mask and hood when wearing the Arctic Mitten Set or Anticontact Gloves required an average of 5.5 seconds.

(7) The E34R2 protective hood provided for use with the E56M4 mask was not compatible with the arctic fur ruff hood. The protective hood could not be donned while wearing the arctic fur ruff hood unless the parka or field jacket was first removed. The protective hood did not provide adequate protection against low ambient temperatures (-37°F to -66°F) and high windchill conditions except when worn under the arctic fur ruff hood (par 6, Annex B).

(8) During the performance of normal crew functions in the M19 cupola to include firing the M65 machine gun, tank commanders preferred to remove the mask's carrier and use the E40 canister harness strap around the waist with the canister on the right side of the waist. This allowed freedom of movement in the cupola during the firing of the machine gun and operation of fire control equipment.

e. Test Nr 4 - Maintenance:

(1) Using appropriate tools and skills, all necessary authorized maintenance was performed on the test filter unit in accordance with the maintenance instructions contained in Technical Instructions 318-12(R) and 521-12(R). Throughout testing, first echelon maintenance was accomplished in an unsheltered area by personnel attired in appropriate arctic clothing to include the Arctic Mitten Set. Second echelon maintenance was performed outdoors under field conditions to an extent sufficient to determine whether it could be accomplished under arctic winter conditions. The times and number of men required to perform first echelon and second echelon maintenance were as follows:

1st echelon (daily)	outdoors - 1 crewman	0.1 hours
2d echelon (quarterly)	indoors - 1 crewman and 1 mechanic	1.2 hours
	outdoors - 1 crewman and 1 mechanic	1.7 hours
2d echelon (monthly)	indoors - 1 crewman	0.6 hours
	outdoors - 1 crewman	0.8 hours
2d echelon (weekly)	indoors - 1 crewman	0.4 hours
	outdoors - 1 crewman	0.6 hours

(2) Total man-hours expended in maintaining the test filter unit, broken down as to organizational and field maintenance, were as follows:

	<u>Scheduled</u>	<u>Unscheduled</u>
Organizational		
1st echelon - 7 man-hours		
2d echelon - 14 man-hours		4 man-hours
Field		2 man-hours
Total - 21 man-hours		6 man-hours

(3) Throughout testing, no unduly difficult or time-consuming maintenance operations were encountered.

(4) Organizational tools and tank OVE tools were adequate for the performance of required maintenance on the test filter unit.

(5) Maintenance instructions provided with the test filter unit were adequate with respect to maintenance under arctic winter conditions.

(6) Parts expended in maintaining the test filter unit were 2, E44 gas filters, installed after 50 hours of operation. Throughout testing, no parts breakage occurred and no parts were required in maintaining the test filter unit other than the 2 E44 gas filters.

(7) During each period of maintenance, the motor housing, particulate filter, gas filter hoses, and canisters were inspected and no accumulation of dust, moisture, snow and ice was encountered in any of these component parts.

f. Test Nr 5 - Durability and Reliability:

(1) During the 1960 - 1961 arctic test season, the test filter unit used in this test (less E56R4 masks, E39 heaters, and other new and modified components provided for this test) was operated a total of 103 hours at ambient temperatures ranging from 30°F to -36°F.

(2) During the conduct of this test, the complete test filter unit (with E56R4 mask, E39 heaters, and other new and modified components

provided for this test) was operated a total of 120 hours, including 350 miles of M60 tank operation over cross-country arctic terrain. The test filter unit and components were stored outdoors and exposed to ambient temperatures ranging from 40°F to -66°F. Cold-soak periods ranged from 6 to 500 hours. During testing with the E56R4 mask connected to the forced air supply, the ambient temperatures ranged from 34°F to -49°F. During testing with the mask disconnected from the forced air the ambient temperatures ranged from 40°F to -66°F. No damage was incurred to the test filter unit resulting from cold-soak, or operation at low ambient temperatures. Damage to one pair of spectacle inserts was encountered during installation of an E56R4 mask (Test Nr 2).

(3) The E56R4 masks and E34R2 hoods with component harness, snaps, buckles, tabs, and hook-loop closures functioned without difficulty or failure throughout the test period.

(4) Throughout the test period, the E39 heaters located at the tank commanders, gunners, and drivers positions functioned without difficulty and provided an adequate amount of warmed air to these positions. The air supply transmitted to the loader's position was excessively cold and crew duties at this position by personnel wearing the mask were limited to periods of 8 to 10 minutes while connected to the forced air supply. (Test Nr 2).

6. DISCUSSION: The eyepiece insert and insert retaining clip (Annex C.7) provided for use with the E56R4 mask was tested in 25 percent of the masks, both connected to and disconnected from the forced air supply. The insert and outsert when used singly or together corrected the previous deficiency of fogging of the eyepiece. The outsert was easier to install and appeared more durable than the insert.

7. CONCLUSIONS: It is concluded that:

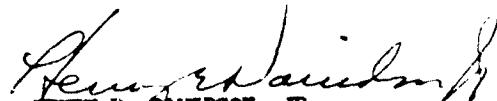
a. The Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2 should be suitable for Army use under arctic winter conditions when the deficiencies listed in Annex B are corrected.

b. The eyepiece inserts and insert retaining clips provided for use inside the E56R4 tank protective mask are not essential for Army use under arctic winter conditions.

8. RECOMMENDATIONS: It is recommended that:

a. The Filter Unit, Gas-Particulate, Tank, Five-Man, E37R2 be modified to correct the deficiencies listed in Annex B and upon correction of these deficiencies be considered suitable for Army use under arctic winter conditions.

b. No further consideration be given to the eyepiece inserts and insert retaining clips provided for use inside the E50R4 tank protective mask for Army use under arctic winter conditions.



HENRY E. DAVIDSON, JR.  
Colonel, Armor  
President

APPENDIX 3:

- A - Omitted
- B - Findings
- C - Photographs

DISTRIBUTION:

- 1 - CG, USCOMARC
- 2 - Ch, R&D Off, Alaska, APO 731
- 3 - Board File

for use on a Minimum Test. This section contains defective readings or illustrations in order to test the item on the basis of the following:

ANSWERS

DEFECTIVE/EXCERPT/SECTIONAL ACTION

SECTION I

ANSWER

Corrected  
1. A complete measurement reading was not received.

Corrected  
2. The test reading was not received  
of the reading.  
so that it was impossible to determine the true value.

Corrected  
3. The test reading was not received  
so that it was impossible to determine the true value.  
and period by the respective.

Corrected  
4. The test reading was not received  
so that it was impossible to determine the true value.  
and pressure.

Corrected  
5. The test reading was not received  
so that it was impossible to determine the true value.  
and pressure.

Corrected  
6. At 20°, when worn disconnected from the pressure  
gauge.

DEFECTIVE/EXCERPT/SECTIONAL ACTION

ANSWER

ANSWER

ANSWER

DEFICIENCY/SHORTCOMINGSUGGESTED CORRECTIVE ACTIONREMARKS

6. The F342 protective hood was not compatible with the arctic fur ruff hood.

7. The forced air delivered to the leader's mask was excessively cold at ambient temperatures ranging from -37° to -49°.

Unknown

Unknown

Test IR 3, Report of Equipment Failure IR 1.

Test IR 2, 3, and 5, Report of Equipment Failure IR 2

Increase size of spectacle rim lip and provide for more adjustment on the lens retaining screw

Test IR 2 and 3, Report of Equipment Failure IR 3.

8. During installation of a pair of spectacle inserts into an F564 mask the lenses fell from the rim (after 1<sup>1</sup>/2 installations and removals).

Note

SECTION II

This section lists those deficiencies and shortcomings in the item which were discovered during test and satisfactorily corrected prior to completion of the test. They no longer represent a deficit in the item tested. The correction must be applied to the production model of this item.

SECTION III

This section contains shortcomings which should be corrected, if it can be done without unduly complicating the item or inducing another undesirable characteristic, either concurrent with elimination of deficiencies in Section I, or in production engineering or by product improvement.

Note



## U.S. ARMY ARCTIC TEST BOARD

FORT GREELY, ALASKA

PROJECT NR ATB 2-12

5 OCT 61

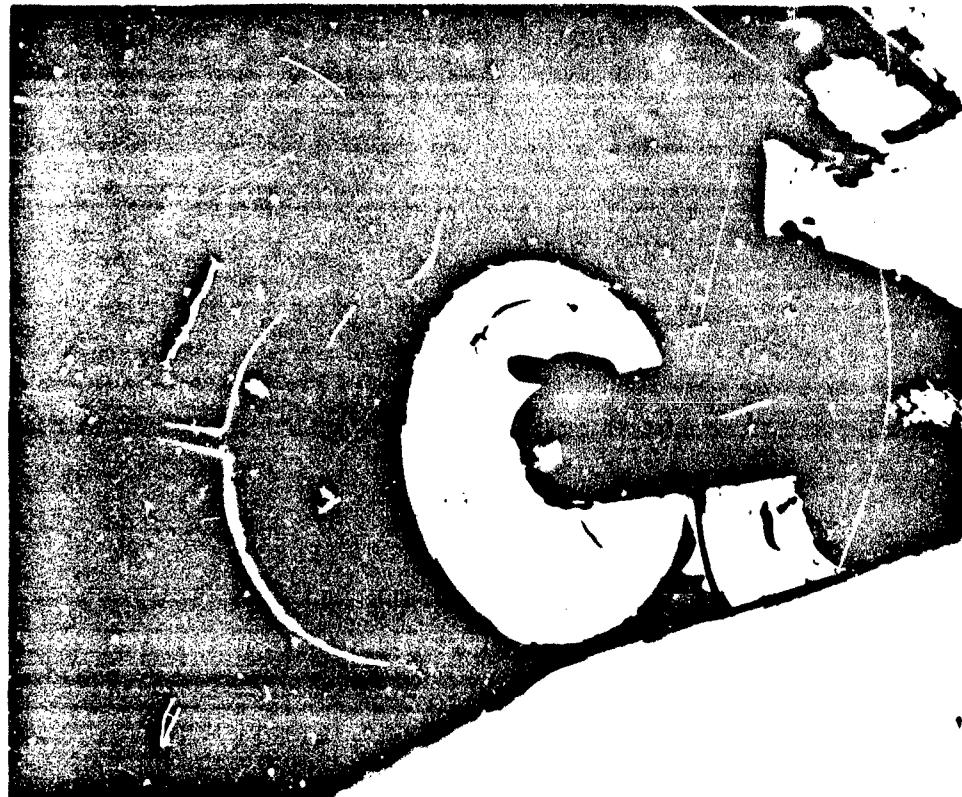
NEGATIVE NR 8-6

CHARGE TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, 137RE

LEFT ARROW - MAIN PRECLEANER AND 145 20 CM  
PARTICULATE FILTER

RIGHT ARROW - SWITCH AND INDICATOR ASSEMBLY,  
GAS-PARTICULATE FILTER

C.1



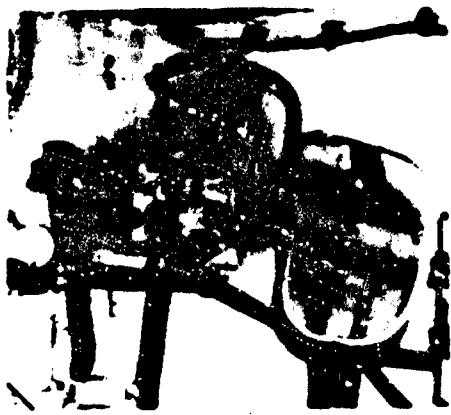
**US ARMY ARCTIC TEST BOARD  
FORT GREELY, ALASKA**

PROJECT NR ATB -12      6 MAR 61      NEGATIVE NR 51 -

CHECK TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, 1370

FIVE TO ONE GAS FILTER

C.



## US ARMY ARCTIC TEST BOARD

FORT GREELY, ALASKA

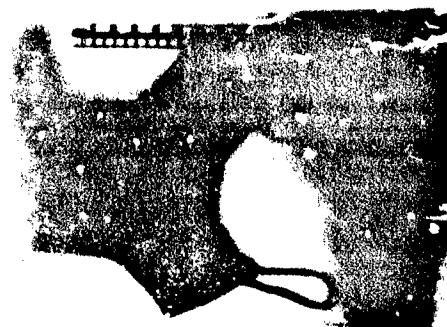
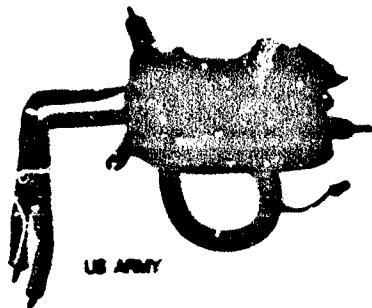
PROJECT NR ATB 2-12

5 OCT 61

NEGATIVE NR 4-

CHIEF TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, M69.

UPPER LEFT - M69 HEATER, LOADER'S STATION  
UPPER RIGHT - M69 HEATER, DRIVER'S STATION  
LOWER LEFT - M69 HEATER, TANK COMMANDER'S STATION  
LOWER RIGHT - M69 HEATER, GUNNER'S STATION



**US ARMY ARCTIC TEST BOARD  
FORT GREELY, ALASKA**

PROJECT NR. 121

DATE 6

NEGATIVE NR. 5-7-1

TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, 1970

UPPER - 1968 TANK PROTECTIVE MASK, CANISTER AND CARRIER  
LOWER - 1971 TANK PROTECTIVE MASK WINTERIZATION KIT

6.1



**US ARMY ARCTIC TEST BOARD  
FORT GREELY, ALASKA**

PROJECT NR ATB 2-12

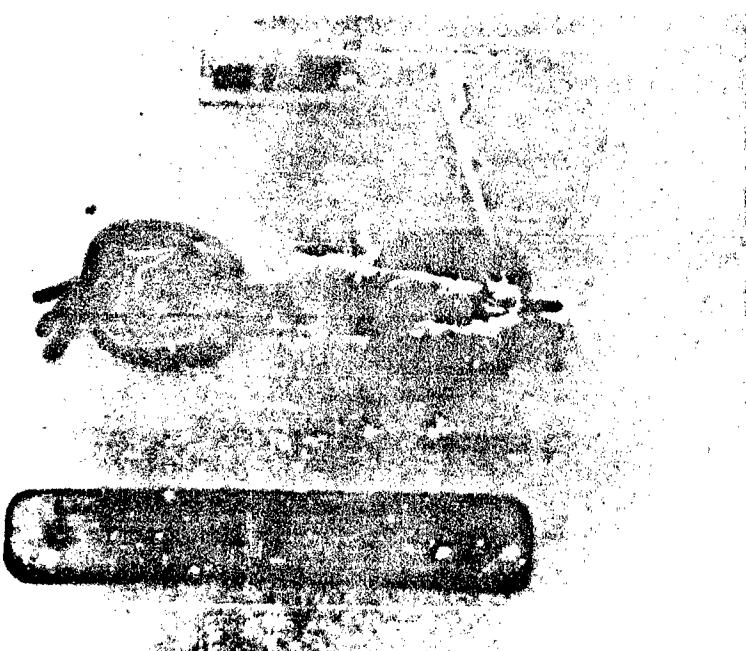
APR 6.

SHOOTING NR 517-1

CHICK TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, F370.

BOARD PROTECTIVE HOOD

C.5



**US ARMY ARCTIC TEST BOARD  
FORT GREELY, ALASKA**

PROJECT NR ATB 2-12

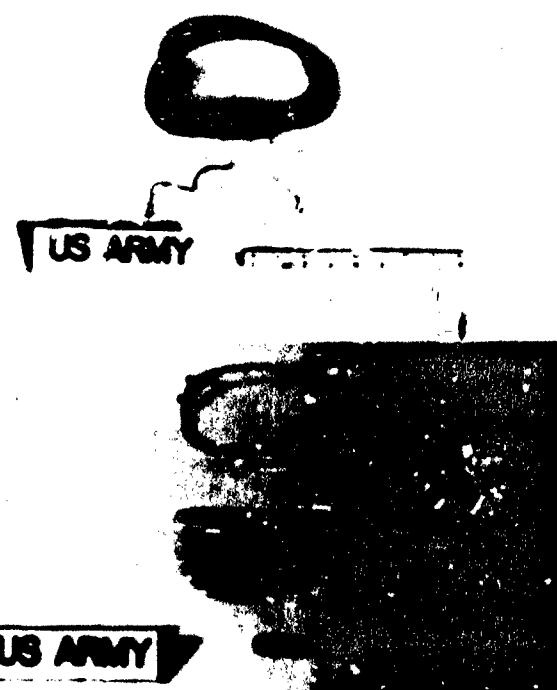
8 OCT 61

NEGATIVE NR B-12

CLOSE SHOT OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, ESTB2

TANK PROTECTIVE MASK SPECTACLES

C.6



## U S ARMY ARCTIC TEST BOARD

PORT GREELY, ALASKA

PROJECT NR AAB 2-12

2 APR 68

NEGATIVE NR 627-1

CHECK TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, E37R2

UPPER - KEEPLINE GUTTERY  
LOWER - KEEPLINE INSERT AND RETAINING CLIP

C.7